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GB 2160137 A GB 2108029 A US 4491042 A
US 4374480 A US 4374479 A US 4254674 A
US 4231271 A

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UK CL (Edition K) B3N N9D N9E N9F N9K
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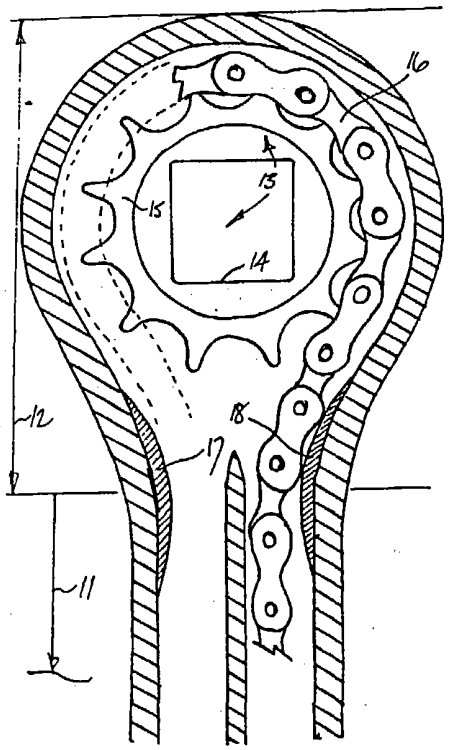
(54) Torque transfer device

(57) A torque transfer device comprising 2 rotatable heads located one at each opposite end region of a generally elongate arm; with transmission means, housed within the arm, operatively linking the heads such that rotation of one head causes rotation of the other; and with one head – the driven head in use – being adapted to accept and to rotate the shank of a socket whilst the other head – the driving head in use – is adapted to accept and to be rotated by the output end of a drive member such as a socket wrench, a power drill, or the like.

Preferably the transmission means comprises a chain-and-sprocket transmission whose sprockets are fixed to respective ones of the rotatable heads. Toothed belt and bevel-and-pinion shaft drives are also disclosed.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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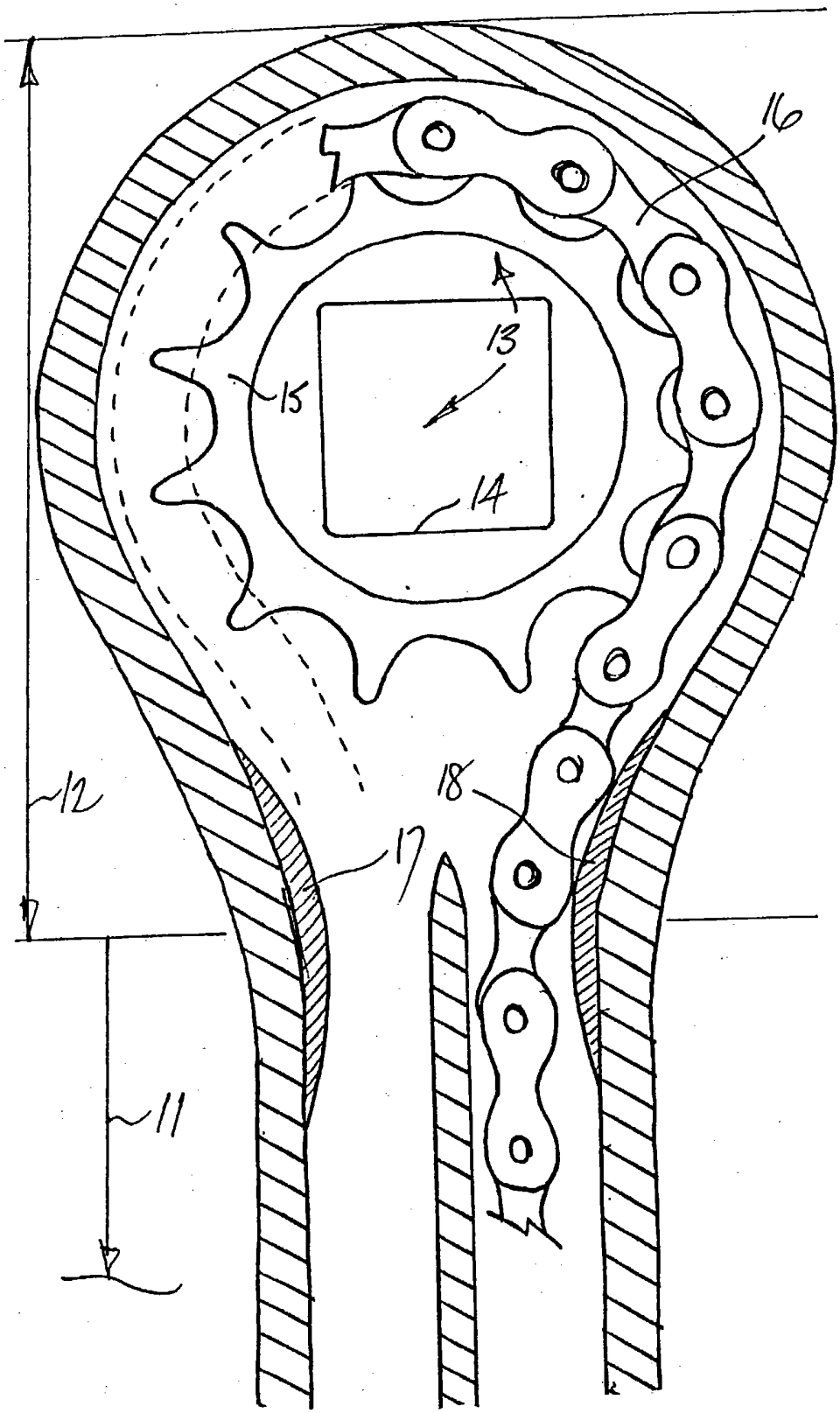
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TORQUE TRANSFER DEVICE

Field of the Invention

The invention relates to torque transfer devices.

Review of Art known to the Applicant

Conventional socket wrenches are well known. They usually incorporate a ratchet mechanism because they are designed to operate in relatively restricted-access areas. The socket set incorporating such a wrench and combining it with an array of varying-size sockets, is well known to every DIY enthusiast as well as to the professional mechanic.

Useful though the conventional socket wrench is, there are nevertheless circumstances in which it either cannot be used or can be used with only limited success. These problems arise because the socket wrench relies for its torque generating capabilities on the length of its arm and the consequent ability to move that arm through an arc - even if it is only a restricted arc - of swing.

If the available arc of swing is either limited or non-existent, the conventional wrench is of little use.

Summary of the Invention

The pr sent invention proceeds from the realization that, if the arm of a socket wrench were to be used to house a means of transmitting to the driven socket head a torque generated elsewhere than in the restricted-access area where the driven head operates, the problems described above could be overcome.

Accordingly the invention in its broadest aspect provides a torque transfer device comprising 2 rotatable heads located one at each opposite end region of a generally elongate arm; with transmission means, housed within the arm, operatively linking the heads such that rotation of one head causes rotation of the other; and with one head - the driven head in use - being adapted to accept and to rotate the shank of a socket whilst the other head - the driving head in use - is adapted to accept and to be rotated by the output end of a drive member such as a socket wrench, a power drill, or the like.

Preferably the transmission means comprises a chain-and-sprocket transmission whose sprockets are fixed to respective ones of the heads. The elongate arm makes the ideal housing and guide casing for such a transmission, and transmissions of this known kind are well-researched, of proven reliability, readily available, and readily replaced when worn.

Preferably also the device is characterized by the absence of a ratchet mechanism from the transmission means. There is no reason why it should not incorporate such a mechanism, just as the conventional socket wrench does. But because the driving head can be rotated by (amongst other things) a conventional socket wrench output shank, there is no need for a ratchet mechanism in such an instance since the conventional wrench already incorporates one of its own.

Those portions of the arm which surround the heads may be enlarged in relation to the generalized width of the main portion of the arm - for overall reasons of optimum use of material, if for no other reason - and in such a case they may incorporate with advantage reduced-friction surfaces internally to guide the transmission means. Especially where a chain-and-sprocket transmission is used, the rollers of the chain will need guiding in such a construction, because the narrowed main part of the arm will pull them in from their passage around the sprocket teeth.

The arm may be with advantage so constructed as to function as a lubricant sump for the transmission means. A cast or pressed steel arm, for instance, lends itself ideally to such usage as it constitutes a hollow sump if properly sealed. Means for the addition and/or removal of the lubricant - for example, a grease injection point and/or a drain plug, either of both of which may with advantage be located adjacent the rotatable head or in the main elongate portion of the arm - may be provided.

Brief Description of the Drawing

The single figure of the accompanying drawing shows, in section and viewed in plan, one end region of a torque transfer device embodying the invention. This device will now be described with reference to the drawing. It is only one form which the invention might take within its broadest aspect.

Description of the Preferred Embodiment

The drawing shows one end region of a chain driven torque transfer device. The other end region is a mirror image of the region illustrated. The overall shape and configuration of the device is thus such as to exhibit 2 heads located one at each opposite end region of a generally elongate and constant-width arm, with the portions of the arm surrounding each head being enlarged

in relation to that generalized width of the main elongate portion of the arm.

The arm, whose main elongate portion is referenced 11 and whose enlarged-diameter head-surrounding portion is referenced 12, is made from (for example) chrome vanadium steel. It is essentially a hollow casing, as shown, manufactured in 2 halves which overlap and seal one against another by means which form no essential feature of the present invention and which can be supplied by the intended skilled addressee of this specification.

The head 13 of this particular device incorporates a square socket 14 to accept the male end of a conventional socket wrench. The head 13 rotates in suitable bearings (not shown) such as ball bearings. It rotates under the action of a sprocket 15 which is fixed to the head and which has a conventional tooth form.

And endless bicycle-style roller chain 16 of known kind engages the teeth of the sprocket 15. The other end of this chain engages the teeth of a similar sprocket, similarly fixed to a rotatably-bearing-journalled head, at the other (not-illustrated) end of the device.

The sprockets and the chain together form a chain-and-sprocket transmission which is housed within the arm 11, 12 and which operatively links the rotatable heads such that rotation of one head causes rotation of the other; and with one head - the driven head in use - being adapted to accept and to rotate the shank of a socket whilst the other head - the driving head in use - is adapted to accept and to be rotated by (in this instance) the male output end of the conventional socket wrench.

Friction-reduced surfaces 17 and 18 are incorporated onto the internal surfaces of the arm 11, 12 at the "shoulder" regions where the main elongate portion 11 of the arm starts to enlarge

into the head-surrounding portion 12. These surfaces 17 and 18 could comprise for example TEFLON (which is a trade mark) coated surfaces. They prevent or at least very substantially reduce wear on the rollers of the roller chain 16 as the rollers pass round the surfaces 17 and 18.

Although a chain-and-sprocket transmission has been illustrated, it is not the only form of transmission could be used. A toothed belt could take the place of the chain 16, with appropriately toothed cogs replacing the sprockets 15, this idea having been used for example in the successful design of belt-driven cam shafts in modern car engines. A bevel-and-pinion shaft drive is another alternative.

The transmission may incorporate reduction gearing between the driving head and the driven head. This would increase the torque applied by the transmission. In the illustrated emodiment, for example, the chain 16 could drive a sprocket such as the sprocket 15 whilst itself being driven by a driving sprocket (the non-illustrated sprocket at the other end of the device) which was smaller in diameter and had fewer teeth than the sprocket 15. Alternatively or additionally, one length of chain could transmit a first reduction from one end of the device to the other; a second length of chain could transmit a second step-down reduction from that other end back to the first end; with a third length of chain finally transmitting the actual driving torque to the rotatable driven head 13 (and with the intermediate sprockets in each case, of course, free wheeling in relation to the driven head as necessary).

Many variations are possible in the practical constructional details of a torque transfer device embodying the invention, but again these form no part of the essential inventive concept and they can safely be left to the skilled reader to supply in detail.

CLAIMS

1. A torque transfer device comprising 2 rotatable heads located one at each opposite end region of a generally elongate arm; with transmission means, housed within the arm, operatively linking the heads such that rotation of one head causes rotation of the other; and with one head - the driven head in use - being adpated to accept and to rotate the shank of a socket whilst the other head - the driving head in use - is adpated to accept and to be rotated by the output end of a drive member such as a socket wrench, a power drill, or the like.

2. A torque transfer device according to Claim 1 and in which the transmission means comprises a chain-and-sprocket transmission whose sprockets are fixed to respective ones of the rotatable heads.

3. A torque transfer device according to Claim 1 or Claim 2 and characterized by the absence of a ratchet mechanism from the transmission means.

4. A torque transfer device according to any of the preceding claims and in which the portions of the arm which surround the heads are enlarged in relation to the generalized width of the main portion of the arm, and incorporate reduced-

friction surfaces internally to guide the transmission means.

5. A torque transfer device according to any of the preceding claims and in which the arm is so constructed as to function as a lubricant sump for the transmission means and incorporates means for the addition and/or removal of the lubricant.

6. A torque transfer device substantially as described herein with reference to and as illustrated in the accompanying drawing.

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